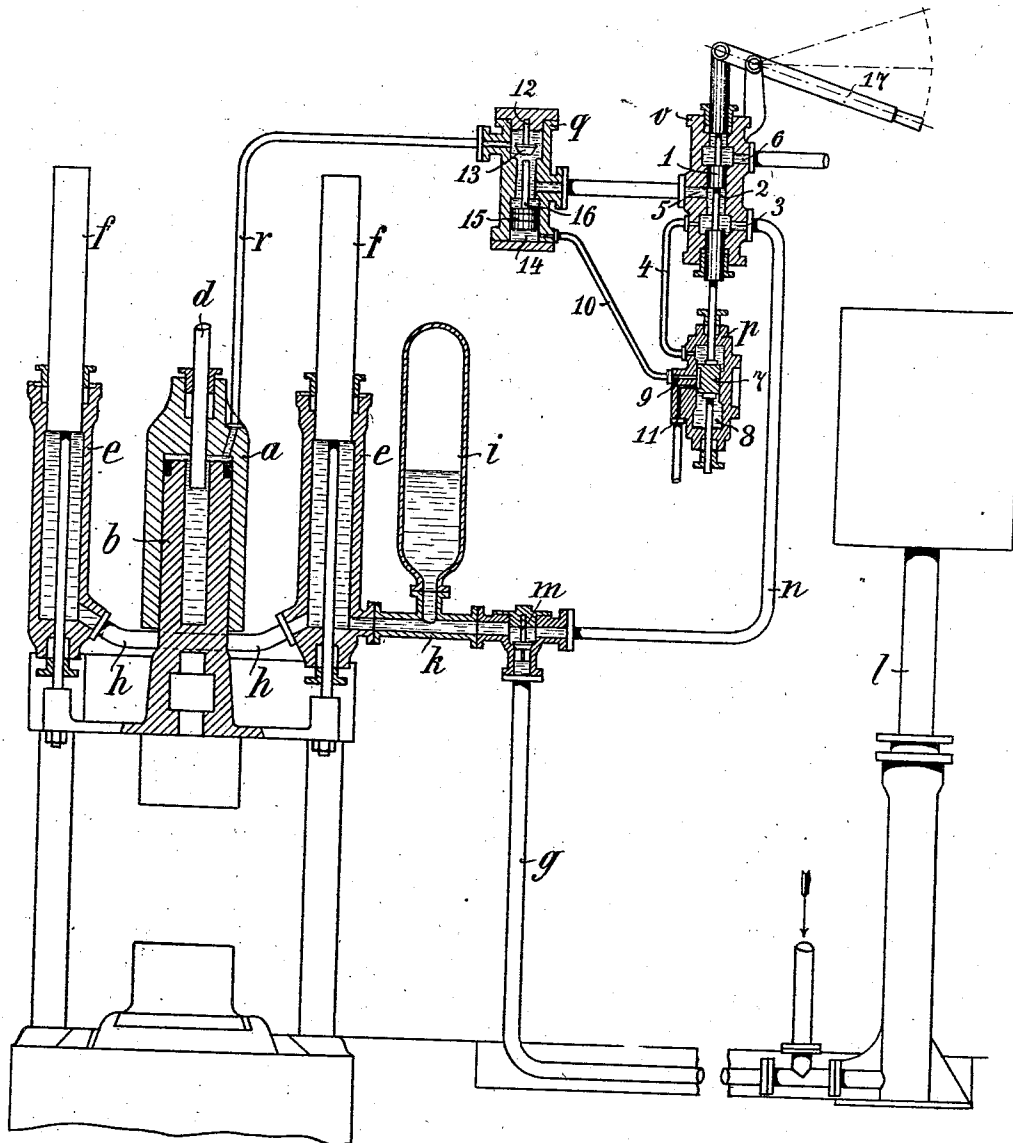


No. 819,988.

PATENTED MAY 8, 1906.

B. GERDAU.
HYDRAULIC FLY PRESS.
APPLICATION FILED OCT. 11, 1899.



Witnesses:
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UNITED STATES PATENT OFFICE.

BERTHOLD GERDAU, OF DÜSSELDORF, GERMANY.

HYDRAULIC FLY-PRESS.

No. 819,988.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed October 11, 1899. Serial No. 733,242.

To all whom it may concern:

Be it known that I, BERTHOLD GERDAU, a subject of the King of Prussia, German Emperor, residing at Düsseldorf, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Hydraulic Fly-Presses, of which the following is a specification.

This invention relates to a hydraulic fly-press which is so constructed that the press for the purposes of rapid operation is not only connected to the pressure-producing device or with the means for admitting pressure to the pressure-cylinder, but also with a second feeding-conduit for the pressure-cylinder, and which is exposed to the pressure of a special pressure-accumulator in such a manner that the return-cylinders are connected to this feeding-conduit and through the same with a collector for an elastic-pressure fluid, which latter is capable of being shut off from the feeding-conduit by means of an automatic closing device. The distinguishing feature of this new combination is that the pressure below the return-piston and in the elastic-pressure collector is never capable of becoming reduced below the accumulator-pressure in the feeding-conduit, so that even the greatest carelessness on the part of an attendant in case of leaks cannot cause any damage. This feature will exist also in case of pressure liquid being caused to flow out from the return-cylinders and from the feeding-conduit to the rear of the pressure-piston for the purposes of a displacement of the pressure-pistons by positive means and by means of a controlling device specially inserted for the said purpose.

The accompanying drawing is a vertical longitudinal section, partly in side view, of my improved hydraulic fly-press.

The letter *a* represents a working cylinder provided with piston *b* and a pressure-plunger *d*. The cylinders *e e* of the return-pistons *f f*, connected to the working piston, are in communication with a special pressure-conduit *g h*, which is independent of the press itself. At the part *k* of this conduit *h* and near to the return-cylinders a receptacle *i* is arranged, which contains air under pressure, &c., for the purpose of direct action upon the said hydraulic conduit. Special hydraulic pressure is produced by any suitable device—by an accumulator *l*, for instance—and the conduit *g*, through which the pressure fluid passes into the conduit *h*, is shut off from the

said conduit by a check-valve *m*, situated at the entrance of the conduit *h*.

To the pipe-conduit *h*, and consequently also to the vessel *i* and with the pressure-accumulator *l*, a circuit-pipe conduit *n* is connected, which leads to a special hydraulic controlling-valve *o p q* and thence through the pipe *r* into the working cylinder *a* of the press at the rear of the piston *b* in order to be able to regulate the adjustment of the same for the length of the stroke just required. This special hydraulic controlling-valve consists of two casings *o* and *p* and of the casing *q* for the adjoining check-valve. Within the casing *o* the piston *1* is movable in the bore *2*. This bore is provided with a number of lateral outwardly-opening passages, of which passage *3* is intended for establishing communication with the pressure-conduit *n*, passage *4* for communication with the second casing *p*, the passage *5* for communication with the valve *q*, and *6* is the water-escape passage. The piston *1* is coupled to a piston *7* in the interior of casing *p*, and this piston moves in a bore *8*, from which a lateral communicating passage *9* leads to a conduit *10* and into the lower part of the casing *q*, while another passage *11* constitutes a water-escape. In the interior of the casing *q*, in the upper part of the same, the valve-cone *13* is guided by means of the rod *12*. The bottom part of the casing is shaped into a small cylinder *14*, surrounding a piston *15*, the lifter *16* of which reaches as far as below the valve-cone *13* and is capable of lifting the valve for the purpose of opening the same. The movement of the valve *13* takes place automatically, the drawing showing said valve raised off its lifter *16* by the pressure of the water flowing from passage *5* to cylinder *a*. The movement of the two pistons *1* and *7* from the position of the passing through of the pressure water into the position of the escape of the water or into the inoperative position is effected by means of the hand-lever *17*.

The operation of the apparatus is as follows: The parts are normally in the position indicated in Fig. 1, but with port *5* closed by valve *1*. When the press-plunger is to be advanced, valve *1* is raised to the position shown in said figure, and water under accumulator-pressure passes to cylinder *a*, check-valve *13* rising to permit such passage, the greater area of the upper end of plunger *b* overcoming the area of the lifting-pistons *f*, water circulating from cylinder *e* to cylinder *a*, and air being

compressed in chamber *i*. The press-plunger having descended upon the work, valve 1 is returned to middle position and check-valve 13 closes. Intensifying-rod *d* is then
 5 actuated to complete the pressing action and is then withdrawn. To raise the press-plunger, valve 1 is lowered to a position beneath port 5, opening port 5 to exhaust port 6 and also depressing valve 7, so as to open port 9
 10 to pressure from pipe 4 and port 3, the pressure thereby admitted beneath piston 15 lifting and holding open check-valve 13 as long as may be desired, the water in cylinder *a* then exhausting through the passage and
 15 ports set forth. The pressure in cylinder *a* being relieved, the air in vessel *i* immediately expands, imparting a quick return movement to the lifting-pistons and press-plunger. Valve 1 is then returned to normal or
 20 intermediate position.

What I claim is—

1. In a hydraulic press, the combination with a pressure-accumulator and withdrawal or return cylinders connected therewith, and
 25 with a pressure-ram cylinder or working piston-cylinder, of a pressure-conduit connecting the withdrawal or return cylinders with said pressure-ram, a separate pressure-chamber containing an elastic fluid on said conduit for

producing pressure in said conduit to operate the pistons of the withdrawal or return cylinders, and a check-valve between the said chamber and the accumulator by which the accumulator may be cut off from said pressure-conduit, substantially as specified. 35

2. In a hydraulic press, the combination with a pressure-accumulator and withdrawal or return pistons rigidly connected to the working piston or ram, of a separate pressure-conduit between the working piston or ram-cylinder and the cylinders of the return-pistons, a separate chamber on said conduit filled with an elastic fluid, a pipe intermediate the said chamber and the working cylinder and connecting with the accumulator, 45 and controlling-valve mechanism in the conduit, said valve mechanism comprising a check-valve, the check-valve having a motor-piston, and connections for lifting the valve in exhausting the press, substantially 50 as specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

BERTHOLD GERDAU.

Witnesses:

WILLIAM ESSENWEIN,
 GEO. P. PETTIT.